Shaping aggressive personality in adolescence: Exploring cross-lagged relations between aggressive thoughts, aggressive behaviour and self-control

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Shaping aggressive personality in adolescence: Exploring cross-lagged relations between aggressive thoughts, aggressive behaviour and self-control

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Abstract

Aggressive ideations can be defined as thoughts, daydreams or fantasies of harming another. They feature in theoretical models of aggressive behaviour causation and are used in violence risk assessments. Little is known, however, about long term relations between aggressive ideations, aggressive behaviour and related variables such as self-control. We examined cross-lagged associations between these variables in the most recent two waves of the Zurich project on social development (z-proso) when the participants were aged 15 and 17. We found that aggressive ideations were highly stable across this time span. The only significant cross-lagged effects were between aggressive behaviour at age 15 and self-control and aggressive ideations at age 17. Results are consistent with the strength model of self-control in which changes in specific self-controlled behaviour can produce generalised changes in self-control. They are also consistent with the hypothesis that aggressive ideations are more a reaction to or a reflection of shared causes with, rather than a cause of, aggressive behaviour. Future studies should aim to integrate measurements across short and long time scales in order to further understand the causal interactions between aggressive ideations and behaviours as they play across at the state and trait level.

Given the significant human and societal costs of violence and aggression, considerable importance is placed on judging if and when an individual is at risk of behaving aggressively (e.g. Fazel, Singh, Doll & Grann, 2012). Identifying predictors of aggression also facilitates the development of theoretical models of its causation. In both contexts, there is interest in aggressive ideations as possible red flags or causal antecedents of corresponding behaviours (e.g. Anderson & Bushmann, 2002; Constantinou, Freestone, Marsh & Coid 2015; Grisso, Davis, Vesselinov, Appelbaum & Monahan, 2000). However, little is known about how aggressive ideations are related to the tendency to behave aggressively, particularly over longer time spans. In this study we explore, from a trait perspective, the extent and nature of interactions between aggressive thoughts, behaviours and an important risk factor for the latter: self-control.

Previous studies concerned with aggressive ideations have utilised variable and usually implicit conceptualisations, therefore, we here begin by defining them as thoughts, daydreams or fantasies of harming another individual, where harm includes both physical and non-physical harm but excludes sexual aggression (see Murray, Eisner & Ribeaud, 2016a). Examples of non-physical harm include humiliation, verbal abuse or bullying. We distinguish aggressive ideations from intentions to inflict harm and from aggressive delusions or hallucinations. Otherwise, we use aggressive ideations as a general term that encompasses more specific cognitions such as anger ruminations (e.g. Sukhodolsky, Golub & Crimwell, 2001) or homicidal ideations (e.g. Kenrick & Sheetsm, 1993). We note, however, that when discussing past research, variations on this definition may have – explicitly or otherwise - been used.

A positive association between aggressive thoughts and aggressive behaviour is reasonably well-established (Daff, Gilbert & Daffern, 2015; Gilbert, Daffern, Talevski & Ogloff, 2013; Kenrick & Sheets, 1993; Nagtegaal, Rassin & Muris, 2006). The majority of

this evidence is, however, based on concurrent assessments of the aggressive thoughts and past or present behaviour and thus has limited ability to speak to long-term causal relations. Understanding long-term causal relations is important because human aggression us not a purely state-like phenomenon; rather, it shows considerable rank-order stability over time (e.g. Tuvblad, Raine, Zheng, Baker, 2009) and processes related to its expression play out over both short and long time scales (e.g. Anderson & Bushmann, 2002).

Several theoretical perspectives propose long-term causal relations between aggressive ideations and aggressive behaviour (e.g. Buss & Duntley, 2005; Huesmann, 1988). In the general aggression model, for example, aggressive ideations can be thought of as the rehearsal, elaboration and integration of aggressive scripts into memory: a process which increases the likelihood of their later preferential reactivation and of aggressive behaviour (Huesmann, 1988; Grisso et al., 2000; Watt, Kohphet, Oberin & Keating, 2013). This predicts that changes in the tendency to experience aggressive thoughts should precede changes in the tendency to behave aggressively. On the other hand, it has been suggested that engaging in aggressive behaviour could provide the fuel and content for future aggressive ideations (e.g. Gellerman & Saddath, 2005): a hypothesis that predicts exactly the opposite. Aggressive thought-behaviour associations do not, however, necessarily reflect directional causal influences and could be due to a common cause or set of common causes that influence both aggressive thoughts and behaviour e.g. an underlying ‘aggressive personality’ or other stable situational risk factors (e.g. Ferguson & Dyck, 2012).

The relation between aggressive thoughts and aggressive behaviour may also involve long-term interactions with other traits related to aggression, for example, both have been linked to self-control. Self-control refers to the capacity to regulate behaviour through effortful control, particularly in regards to the inhibition of prepotent responses and in the service of longer-term goals. Like aggression, while levels of self-control show cross-

situation variability, the tendency to exercise it effectively is a relatively stable and enduring trait (e.g. Beaver, Wright, DeLisi & Vaughn, 2008). Trait self-control is related to a range of important outcomes with individuals high in trait self-control tending to enjoy better physical and psychological health, achieving greater educational success, and experiencing better interpersonal relationships (de Ridder, Lensvelt-Mulders, Finkenauer, Stok & Baumeister, 2012; Moffit et al., 2011).

Trait self-control has also shown strong links to aggressive behaviour. For example, individual differences in self-control and associated brain regional volumes are related to variation in aggressive behaviour (e.g. Finkel, DeWall, Slotter, Oaten & Foshee, 2009; Yang & Raine, 2009) and conversely, there is evidence that self-control interventions decrease aggression (Denson, Capper, Oaten, Friese & Schofield, 2011; Piquero, Jennings & Farrington, 2010). The link has been attributed to high self-control facilitating the inhibition of aggressive behaviours at the points at which urges to aggress arise (Denson, DeWall & Finkel, 2012).

Experimental studies have found that aggressive ideations may work against the self-control-based inhibition of aggressive impulses. Angry, revengeful thoughts appear to place a strain on an individual that consumes self-control resources and thus compromises the capacity to inhibit aggressive urges (Denson et al., 2011; White & Turner, 2014). Thus, in the short term high self-control may prevent aggressive thoughts from being translated to aggressive actions; however, these same aggressive thoughts can also temporarily erode the capacity for this kind of inhibition.

These short term interactions could engender long term changes in self-control, aggressive ideations and aggressive behaviours. For example, with regards to self-control, a number of studies have suggested that the trait is not only malleable, but can be trained like a

muscle (e.g. Muraven, 2010). Evidence from intervention studies has indicated that practicing small acts of self-control on a daily basis can increase self-control in a general way (Hagger, Wood, Stiff, Chatzisatantis, 2010). It is, therefore, also possible that naturalistic changes in specific self-controlled behaviours – such as inhibiting aggressive urges- could mimic this training effect. Conversely, increases (or decreases) in trait self-control should translate into decreases (or increases) in trait aggression because an individual should be better (or worse) equipped to inhibit aggression over the long term.

Very few empirical studies have been conducted that speak to long-term interactions between aggressive ideations, aggressive behaviour and related variables. A study conducted in psychiatric patient samples found significant relations between aggressive ideations measured during hospitalisation and violent acts within 20 weeks of discharge (Grisso et al., 2000); however, because the analysis did not control for previous levels of aggressive behaviour it was not possible to disentangle the various possibilities regarding direction of causation. No studies have, to our knowledge, examined long term relations between aggressive ideations and aggressive behaviour considering the possible role of trait self-control. It was, therefore, our aim in the current study to provide an exploration of how these three traits influence over the longer term.

Method

Participants

The sample consisted of youths who participated in the most recent two waves of the Zurich study on the Social Development of Children and Youths (z-proso). Z-proso is a longitudinal cohort study focussed on the development, antecedents and consequences of pro- and anti-social behaviour in late childhood and adolescence. A comprehensive description of the study in terms of recruitment, attrition, measures and sample characteristics can be found

in prior publications e.g. Eisner & Ribeaud (2007), Ribeaud & Eisner (2010) and on the study website: http://www.z-proso.ethz.ch/ .

In the two waves of data included in the current study, the majorities of individuals were aged 15 and 17, respectively. At these ages, there were 1307 (660 male, 647 female) individuals who contributed data on the constructs of interest for this study. This represents 83% of the initial sample recruited at wave 1 when the majority of participants were aged 7.

Measures

All measures were administered in German, reflecting the official language of Zurich: the study location. English translations of all items used in the study are provided in Table 1. Each measure is described in detail below.

Aggressive ideations

As a measure of Aggressive ideations, we used 4 items tapping thoughts of reactive aggression, instrumental aggression, relational aggression and serious physical aggression (homicide). The first three were presented following a vignette giving an example of the kind of behaviour referred to and were measured on a 4-point scale from 'never' to '(almost) every day'. These items were originally developed as part of a larger judgement and decision-making measure (see Averdijk, van Gelder, Eisner & Ribeaud, 2016) but their content and wording suggests that they capture VIs, consistent with our above-given definition (Murray, Eisner, Ribeaud, 2016a). The serious physical aggression (homicidal) ideation item was presented without vignette and was measured on a five-point scale from 'never' to 'very often'. All items referred to a time period covering the previous month.

Self-control

As a measure of self-control, we used a brief 4-item scale derived from an adaptation of Grasmick's (1993) Low self-control scale (later modified by Longshore, Turner & Stein, 1996). The scale and its derivatives and adaptations have been widely used in studies of crime and deviant behaviour and its psychometric properties have been extensively evaluated, including in the current sample (Ribeaud & Eisner, 2006). The scale was originally developed based on Gottfredson & Hirchi's (1990) self-control theory which holds that the construct comprises 6 inter-related components: impulsivity, self-centredness, risk-seeking, volatile temper, preference for simple tasks, and preference for physical over cognitive or verbal activities. We selected items to provide coverage of the first four components only because the latter two components were judged not to conform to the conceptual definition outlined in the introduction and which forms the basis of most contemporary research into self-control outside of the domains of crime and delinquency (e.g. De Ridder et al., 2012). Participants were asked to respond with reference to how true the statements were of them, on a 4-point scale from 'fully untrue' to 'fully true'. Items were coded such that high scores on the items represent lower levels of self-control.

Aggressive behaviour

To provide conceptual alignment with the aggressive ideation items, we formed a brief aggressive behaviour measure with fours items; one each to measure: reactive aggression, instrumental aggression, relational aggression and serious physical aggression. This way, the particular content of the violence measure corresponded closely to the particular content of the aggressive ideation measure (see Table 1). This is in line with the 'compatibility principle': a principle important in the study of intention-behaviour links and which arguably applies equally to thought-behaviour links (e.g. Azjen, 2002). These items were selected from a larger set of aggression items administered from the Social Behavior Questionnaire (SBQ; Tremblay et al., 1991). The SBQ has been widely used in past empirical

research and psychometric evaluations support the validity and reliability of the selected aggression items (e.g. Murray, Eisner & Ribeaud, 2016b). Items were rated on a five-point scale from 'never' to 'very often'.

Statistical Procedure

Overview

All models were estimated in *Mplus 7.0* using weighted least squares means and variances (WLMSV) to account for the ordered-categorical nature of the data (Muthén & Muthén, 2010). Missing data were dealt with by pairwise deletion which was judged reasonable given that pairwise missingness was <5% for all pairs of observed variables.

Psychometric analysis

We began by assessing longitudinal measurement invariance for each construct. We tested several levels of invariance beginning with configural (*patterns of loadings* fixed equal across time), then metric (*magnitudes of loadings* fixed equal across time) and finally scalar (*thresholds and loadings* fixed equal across time). In the configural model, we fixed the mean and variance of the relevant latent variable at age 15 to 0 and 1, respectively, while also constraining the loading and first threshold of one indicator to be equal across time. In this and in all subsequent (i.e. more restricted) models, the residual covariances between the same items measured across time and the covariance between the relevant latent variable across time were freely estimated. To test metric invariance we added invariance constraints to the configural model on the remaining unconstrained item loadings. To test scalar invariance we then also added invariance constraints on the remaining unconstrained thresholds. At these two stages we assessed the change in fit using a chi-square difference test with appropriate scaling corrections given the use of a WLSMV estimator (see Asparouhov, Muthén &

Muthén, 2006). If invariance did not hold at either stage, we used modification indices to identify any non-invariant loadings or thresholds. These were released with the goal of finding a partially invariant model.

Cross-lagged Panel Models

We first fit univariate autoregressive models for each of the constructs using the measurement models developed as per the description above. We used these explicit measurement models rather than sum scores to avoid attenuation due to unreliability and unwarranted assumptions about measurement invariance. The stability coefficients from these provide estimates of the rank order stability of aggressive ideations, self-control and aggressive behaviour. We then fit a cross-lagged panel model for aggressive ideations, self-control and aggressive behaviour. The cross-lagged coefficients from these models provide estimates of the extent to which age 15 variables predict age 17 variables controlling for prior levels of all other constructs included in the model. These models are summarised in Figures 1-4. For clarity, the measurement models are omitted from the cross-lagged model figures and variances and mean structures are omitted from all figures.

Results

Preliminary analyses

Aggressive ideations

The configural invariance model for the aggressive ideation items showed good fit (RMSEA=.029, CFI=.98, TLI=.97, WRMR=0.82). Metric invariance held [$\chi^2(3)=0.45$, $p=.93$]; however, scalar invariance did not [$\chi^2(12)=54.25$, $p<.001$]. After releasing several invariance constraints, guided by modification indices, partial scalar invariance could not be achieved. The general pattern was for thresholds to be higher at wave 15, but especially in the

items tapping ideations related to instrumental aggression and serious physical aggression. This means that participants tended to require a higher overall level of violent ideational tendency to endorse higher response options on these items at age 15 as compared to age 17. We, therefore, used the metric invariance measurement model as the basis for all subsequent analyses involving the aggressive ideation items. In this model the correlation between aggressive ideations at age 15 and aggressive ideations at age 17 was r=.70 (p<.05). In addition, aggressive ideation levels were lower at age 17 (mean difference = -0.57) but showed more variance (variance at age 17=1.23 compared with 1 at age 15).

Self-control

For the self-control construct, the configural invariance model showed good fit (RMSEA=.08, CFI=.95, TLI=.90, WRMR=1.58). Both metric invariance [$\chi^2(3)$=7.41, p=.06] and scalar invariance [$\chi^2(11)$=15.91, p=.14] held, therefore, the scalar invariance model was used as the measurement model in all subsequent analyses. The correlation between self-control at age 15 and age 17 based on this model was .55 (p<.05). Self-control was also both lower at age 17 (mean difference = -0.12) and less variable (variance = 0.90 compared with 1 at age 15).

Aggressive behaviour

The configural model for aggressive behaviour showed reasonable fit (RMSEA=.087, CFI=.97, TLI=.94, WRMR=1.51) and metric invariance held [$\chi^2(3)$=0.641, p=.89]. Scalar invariance did not hold, however [$\chi^2(15)$=30.86, p=.01]. Guided by modification indices, we released the invariance constraints on the first and second thresholds of the instrumental aggression item. Both thresholds were higher at age 15. This gave us a partial scalar invariance model [$\chi^2(13)$=20.02, p=.09] which we adopted as the aggressive behaviour measurement model for all subsequent analyses. In this model, the correlation between

violence at ages 15 and 17 was r=.67. There was less violence at age 17 (mean difference=-0.32) but the variance in aggressive behaviour was effectively the same (1.03 at age 17 compared to 1 at age 15).

Cross-lagged panel model

Using the above-described measurement models, we fit univariate autoregressive and cross-lagged panel models. Standardised parameter estimates are provided in Figures 1-4. Statistically significant parameters (p<.05) are italicised. The autoregressive paths suggest moderate to high temporal stability in all of aggressive ideations, self-control, and aggressive behaviour. Controlling for low self-control and aggressive behaviour at age 15, aggressive ideations at age 15 did not significantly predict aggressive behaviour at age 17. Similarly, although aggressive behaviour at age 15 significantly predicted aggressive ideations at age 17 controlling for the other age 15 predictors, the effect was modest. There was a strong correlation between aggressive ideations and aggressive behaviour at age 15 and there remained a modest residual association between these traits at age 17. There was also no significant cross-lagged effect of self-control on aggressive ideations or the reverse. Overall, the only significant cross-lagged effects were of aggressive behaviour at age 15 on self-control and aggressive ideations at age 17, such that more aggressive behaviour at age 15 predicted lower self-control and more aggressive thoughts at age 17.

Discussion

In the current study, we explored long term interactions among aggressive ideations, aggressive behaviour and self-control. A central focus was on aggressive ideations in particular because very little was previously known about the extent to which they show stable, trait-like properties and whether they change in meaning and level over adolescence. We found that the tendency to experience aggressive ideations was highly stable across time,

showed a modest decline between the ages of 15 and 17 and was moderately to strongly correlated with aggressive behaviour and self-control within time points, even after controlling for past levels of each. In the broader context of trait-level links between aggressive ideations, the only significant cross-lagged effects were of aggressive behaviour on aggressive ideations and self-control.

Our study was the first to our knowledge to evaluate the properties and correlates of aggressive ideations as a trait-like variable. The high stability of aggressive ideations between ages 15 and 17 supports the contention that the tendency to experience aggressive ideations has trait-like properties. Its stability coefficient of r=.63 was similar to that of aggressive behaviour (r=.67), which is generally considered to be relatively stable by the period of life studied.

At the same time, our results suggested a developmental nature to aggressive ideation. Full measurement invariance for our aggressive ideation items did not hold across ages 15 and 17 and two items in particular showed measurement differences that may be relevant for understanding how the perception of aggressive ideations may change across adolescence. Specifically, the items measuring ideations of instrumental aggression and ideations of serious physical aggression (homicide) had higher thresholds at age 15 than at age 17. This result, therefore, can be interpreted as for the same level of latent aggressive ideational tendency, scores on these items would be higher at age 17 than at age 15. That is, individuals are more likely or willing to endorse aggressive ideation items referring to instrumental and homicidal ideation at age 17 than 15 given the same level of aggressive ideations. One possibility is that social desirability effects are reduced by age 17, possibly because at this stage the participants have been previously exposed to the questions and are less affected by their potentially sensitive nature. Of note, a similar pattern was observed for the reports of

violent behaviour. Here the threshold was also lower at age 17 for the arguably most negative item in social desirability terms i.e. serious physical violence.

In terms of the role of aggressive ideations in the broader net of variables related to aggressive behaviours, there was no evidence that it was causally influencing self-control and aggressive behaviour over the studied time scale. There was, however, a significant positive cross-lagged effect of aggressive behaviour on aggressive ideations, consistent with the suggestion that aggressive behaviour could inspire subsequent ideations (e.g. Gellerman & Saddath, 2005). The only other significant cross-lagged effect was from aggressive behaviour to lower self-control. This is consistent with the hypothesis that changes in self-controlled behaviours can bring about generalised changes in trait self-control because all such behaviours fundamentally draw on the same resource (e.g. Hagger et al., 2010). The idea is that this resource can be strengthened by exercising self-control in one domain, leading to an overall increased capacity for self-control in others.

Our results also indicated that aggressive ideations and behaviour tended to co-occur in the short term, as indicated by their moderate to strong correlations when measured at the same age. Further research will be required to characterise any short term mechanisms responsible for this co-occurrence to, for example, establish whether aggressive ideations, in the short term, precede and support or promote aggressive behaviour. Another possibility is that aggressive ideations and aggressive behaviour are both indicators of an aggressive personality that manifests in both thoughts and behaviour. If aggressive ideations represent a stable aspect of an aggressive personality, this implies that personality measures of aggression could benefit from including aggressive ideation items. Aggression and related traits feature in major personality inventories e.g. in the Angry Hostility facet of the NEO-PI-R (Costa & McCrae, 1992) and the Aggression dimension of the Minnesota Personality Questionnaire (Tellegen & Waller, 2008), however, items tend to refer to overt behaviours to

the exclusion of thoughts, daydreams or fantasies of violence. The same can also be said of assessments focussed specifically on aggression such as the Aggression Questionnaire (Buss & Perry, 1992) and Reactive Proactive Aggression Questionnaire (Raine et al., 2006). However, one limitation in incorporating aggressive ideations into trait measures of aggression is that the occurrence of aggressive ideations will be invisible to observers and thus not be feasible for informant (as opposed to self) reports of trait aggression.

Finally, future research should evaluate multi-time scale interactions among aggressive ideations, aggressive behaviour and self-control. Although it is known that there are important state-level processes linking these constructs, virtually nothing is known about how these translate into or interact with trait-level processes. To answer these questions, designs that use intensive, short-term measurements such as experience sampling (e.g. see Hoffman, Baumeister, Förster & Vohs, 2012) should be combined with longer-term measurements (e.g. see Ram et al., 2014).

Limitations

In terms of study limitations, we were unable to partial out individual differences in aggressive ideations, self-control and aggressive behaviour owing to the availability of only two waves of data on aggressive ideations, thus our results conflate within- and between-individual patterns (e.g. Hamaker, Kuiper & Grasman, 2015). Second, we used a measure was of 'general aggression' that included both reactive and proactive aggression. Reactive aggression represents a 'hot' reaction to provocation whereas proactive aggression is considered a 'cold' and more calculated behaviour (e.g. Raine et al. 2006). It is possible that self-control may, in particular, has importance only in regards to inhibiting the anger-laden urge to aggress that occurs in reactive aggression (e.g. DeWall, Finkel & Denson, 2011;

White & Turner, 2014). Thus, using a pure measure of reactive aggression may have been more sensitive to detect effects involving self-control.

Conclusions

The tendency to experience aggressive ideations appears stable and trait-like, to decline between the ages of 15 and 17 and is affected in the long term by aggressive behaviour. Aggressive ideations did not show any evidence of long term causal relations with self-control but self-control did appear to be affected by violent behaviour. This latter result is consistent with the strength model of self-control which holds that changes in specific self-controlled behaviours (e.g. behaving more or less aggressively) can have generalised effects on trait self-control levels.

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Table 1: Measures used in current study

Item	Sub-domain
Low Self-control	
I often act on the spur of the moment without stopping to think.	Impulsivity
I try to get the things I want even when I know it's causing problems for other people.	Self-centredness
Sometimes I do dangerous things just for the fun of it.	Risk-seeking
If I don't get something I want immediately, I get angry pretty quickly.	Volatile temper
Violence	
You hit someone after they insulted you.	Reactive aggression
You intimidated other adolescents to get what you want.	Instrumental aggression
When you were mad at someone you got others to dislike that person as well.	Relational aggression
You physically attacked other people.	Serious physical aggression
Violent ideations	
How often have you thought about hitting someone who was mean to you?	Reactive aggression
How often have you thought about taking something you want from someone by using violence?	Instrumental aggression
How often have you thought about intimidating someone you don't like?	Relational aggression
I thought about killing someone I know	Serious physical aggression

Figures

Figure 1: Aggressive ideations (AI) autoregressive model

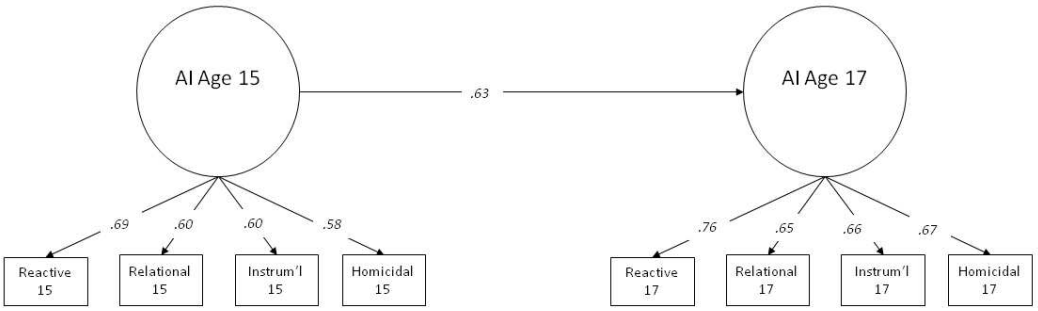

Figure 2: Aggressive behaviour (AB) autoregressive model

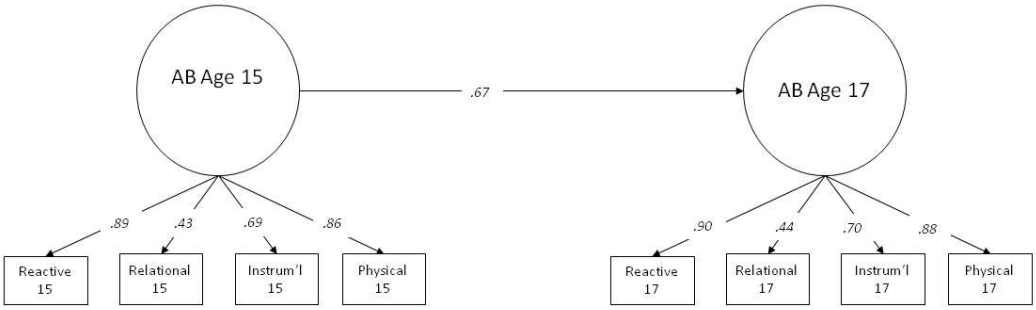

Figure 3:Low self-control (Low SC) autoregressive model

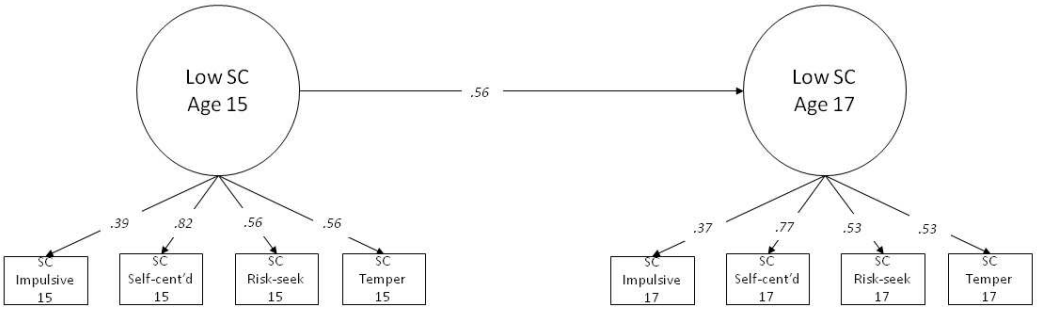

Figure 4: Cross-lagged panel model for aggressive ideations (AI), aggressive behaviour (AB) and low self-control (Low SC)